Research Article

Enterprise Financial and Tax Risk Management Methods under the Background of Big Data

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Taking enterprise tax risk management as the research object, it analyzes the specific management mode and countermeasures by combining the current big data background. Taking enterprise A as an example, a tax risk assessment model is constructed. Through the AHP-entropy weight method, the tax risk of enterprise A is quantitatively analyzed and the tax risk is analyzed. And the evaluation model is extended to the tax risk evaluation of the whole industry. The results show that enterprises have faced greater tax risks in recent years. Since 2019, tax risk has been higher than the industry level, which is closely related to enterprise A's neglect of tax risk. The tax risk of enterprise A in 2022 will be greatly alleviated, and the tax risk will be 0.63% higher than the industry level. This is roughly in line with industry risk. This is inseparable from the fact that with the gradual deepening of society's understanding of tax risks, the enterprise is also inclined to control tax risks in daily operations and corporate decision-making. According to the results of risk assessment, an effective strategy for enterprise tax risk management in the era of big data is proposed. It is expected that this tax risk assessment method will be extended to the whole industry.

1. Introduction

In February 2012, the New York Times op-ed mentioned that the era of big data had arrived. In business, economics, and beyond, decisions will increasingly be made based on data and analytics [1, 2]. And decisions are not based on experience and intuition. The era of big data brings historic changes. The first and foremost feature is that big data has completely changed the way people think [3]. People not only have more data but also have more information and will have a broader vision and richer thinking. People also have a subversive understanding of traditional business and social and economic systems. This change in thinking mode has produced views on work, life, system, and other aspects. It generates more demand and better motivates people to use new thinking and improve existing technology to supply those needs. The advent of the era of big data has not only brewed revolutionary changes in the entire society but even contributed to the progress of the entire social civilization [4, 5].

With China's economic development entering a new era, and the deepening of national strategies such as the "Belt and Road," China has become more and more connected with the world. The pulse of China's economy is more and more closely related to the changes of the times [6]. The rapid development of information media and Internet technology has made China, like other countries in the world, enter an era of information explosion. The development of taxation in our country is also changing with each passing day [7].

From the initial tax collection and management method of "one tax officer, one bicycle, and one tax receipt," it has gradually become the current "diversified and information-based" tax collection and management method. In the information age, the growth rate of tax data far exceeds the manual processing ability of tax staff. This is particularly evident in the management of tax risks. With the explosion in the number of taxpayers and tax-related data, traditional tax risk management methods can no longer meet today's needs. At this time, big data approach is efficient and convenient in processing massive data and its accurate

prediction function. Big data approach has opened up new ideas for extending the depth and breadth of tax risk management and promoting tax risk management from postsupervision to ex ante prediction [8]. Against this background, the State Administration of Taxation established the Tax Big Data and Risk Administration at the end of 2019. The agency is mainly responsible for the work related to national tax big data and risk management. This is also the first time that big data and tax risk management are closely linked at the national level [9].

Tax-related risks are called tax risks from the perspective of tax authorities. The key reason for tax risk is the information asymmetry between the tax collectors. Due to the game between the two sides of tax collection, the traditional tax risk management is ineffective. At the same time, changes in economic globalization, innovation in business structure and financial products, and "Internet +" have further increased the difficulty of tax risk management [10, 11]. In order to improve the level of tax risk management and reduce the friction between the two parties, the use of information technology will greatly improve the efficiency of tax services and improve the level of tax risk management. The application of information technology comes from big data. Therefore, it has certain practical significance to study how to improve the tax risk management ability under the background of big data [12].

Facing the complex economic environment and tax-related risks, tax management in enterprise management has also become more complex. How to make full use of the information resources of big data to optimize the tax structure of enterprises and carry out tax planning can reduce tax costs and improve the economic benefits of enterprises. The healthy, legal, and compliant development of enterprises and keeping pace with the times to adapt to the economic and social development of the new era has become a new topic of corporate tax management in the era of big data.

The study of tax risk management is of great significance to every enterprise. A full grasp of tax management will help improve the management and business capabilities of the enterprise while maximizing the economic profit of the enterprise and reducing the probability of tax risks. The research object of this paper is the tax risk management of enterprises, combined with the current big data background to analyze the specific management mode and countermeasures.

2. Basic Concepts and Theories

2.1. Concepts and Characteristics of Big Data.
The tax risk identification research based on big data mainly involves related concepts such as tax risk, tax risk management, tax risk identification, big data, and tax big data. Big data is a modern means of production. It refers to the massive, large-scale, and full-scale data that can be acquired, collected, and aggregated on a unified processing platform. It is also a management tool that can provide decision-making and application support for managers or users through professional computer processing [13]. The practical experience of

tax collection and management in recent years also shows that the necessity of using big data to improve the management efficiency of government departments has emerged. Now is the best time for development and research in the era of big data, and it is particularly urgent for government departments to use big data. This is mainly reflected in the fact that big data is not only an important manifestation of the characteristics of a large enterprise that is the object of tax collection and management but also an important content of the means of tax collection and management. The application of big data is a major measure for more and more countries in the world to improve the professional management level and quality of large enterprises [14]. At the same time, the era of "Internet +" has put forward new challenges and new requirements for the application of big data to improve the professional management efficiency of large enterprises. The interaction of cloud computing and artificial intelligence can better realize the value-added data of big data (as shown in Figure 1).

The tax big data refers to the effective collection, processing, and integration of various tax-related data information in multiple ways. It also conducts specialized data processing and in-depth data application for massive tax-related information. In the era of big data, tax data management faces multiple challenges. The number of taxpayers has grown rapidly, and production and business activities have been constantly changing and becoming increasingly complex. It shows a trend of diversification. Large-scale enterprise groups across regions and industries have emerged one after another. It presents the internationalization and cross-regionalization of tax sources. The complexity of taxpayer accounting has increased. It presents the trend of electronization, teamwork, and specialization. Taxpayers' legal awareness and rights protection awareness have been continuously enhanced, tax-related appeals have become diversified, and service needs have been personalized.

Big data has many characteristics [15], and a more representative view is the "4V" model. It includes volume, velocity, variety, and value. They represent, respectively, the sheer volume, staggering velocity, variety, and low-value density of big data (as shown in Figure 2).

2.2. Financial Tax Risk and Financial Tax Risk Management

2.2.1. Financial Tax Risk.
Tax risk is divided into narrow and broad tax risk in the research. Tax risk in a broad sense refers to a risk that the tax revenue cannot meet the state's fulfillment of its functions due to various reasons. It exists in all aspects of tax collection and management, including tax policy risks, tax source collection and management risks, and tax law enforcement risks. Tax risk in a narrow sense is the risk of tax noncompliance. The tax-related behavior of taxpayers is inconsistent with the tax obligations stipulated by the existing tax laws and regulations. This not only fails to perform its due tax obligations as required but also creates the risk of not paying taxes on time or underpaying taxes [16].
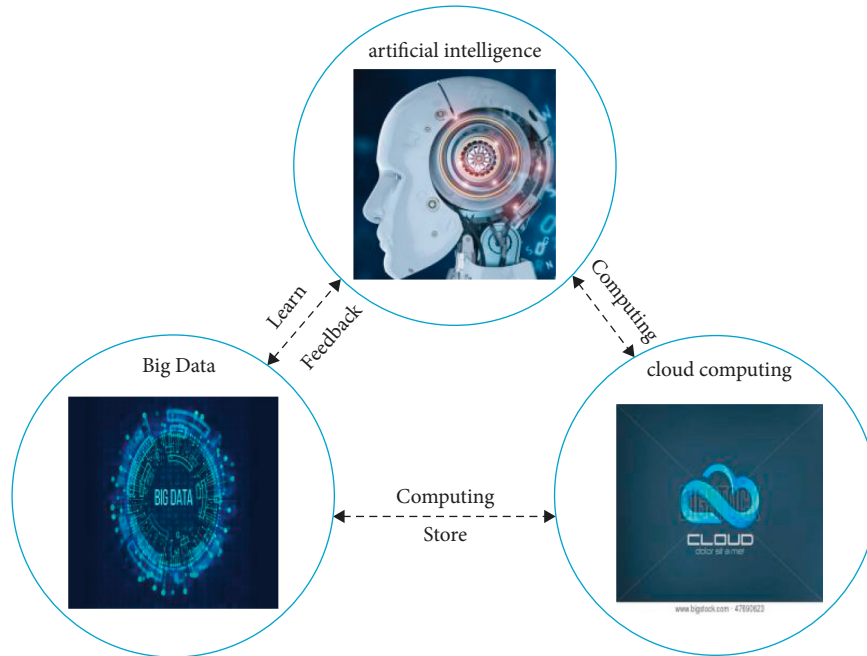
FIGURE 1: The relationship between big data, cloud computing, and artificial intelligence.
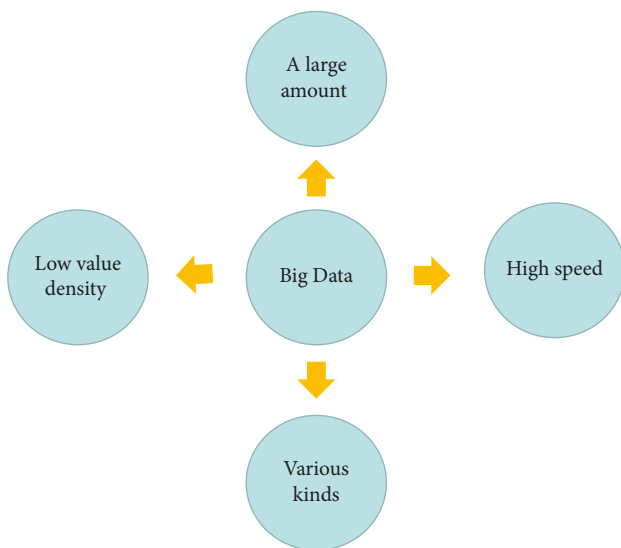

FIGURE 2: Characteristics of big data.

2.2.2. Financial Tax Risk Management. As a kind of risk, tax risk has many characteristics of risk. Risk is a probabilistic event. Taxpayers may not comply with tax laws and regulations, which is the possibility of tax risk. The second is concealment. Under the market economy, taxpayers' daily business activities are complex and diverse, and their tax risks are also ever-changing. It is difficult for tax authorities to discover all risks. The third is persistence. Under the complicated market, many taxpayers have the same or similar tax risks. The sources of these risks may be caused by unclear policies, inconsistent law enforcement calibers, and differences in interpretation of laws and regulations. This creates a tax risk that exists between individual taxpayers for a long period of time [17].

Tax risk management mainly consists of target planning, information collection, risk identification, ranking, risk response, process monitoring, and evaluation feedback as well as the revision and correction of planning objectives through evaluation results. As a result, a closed management loop of benign interaction and continuous improvement can be formed.

There are several reasons for strengthening tax risk management in taxation work.

(1) The premise of tax work is to complete the tax revenue. Tax risk management can effectively prevent and control tax evasion by taxpayers and fill the loopholes in tax collection and management. It not only ensures the seriousness of taxation work but also promotes the effective growth of tax revenue.

(2) The previous tax collection and administration methods are no longer suitable for the rapid development of the economy. The future tax collection and administration model will be a new collection and administration model dominated by tax risk management. In this way, the limited resources in the tax collection and management work can be reasonably allocated to the places where they are most needed, and the innovation of the tax collection and management method can be realized.

(3) The advanced regions of foreign taxation systems have gradually formed a new model combining taxation risk management and taxation administration and have achieved outstanding results in practice. Therefore, tax risk management is of great significance to improving China's tax governance capacity and realizing modern taxation. It is also an important guarantee for the construction of a scientific tax collection and management system.

2.3. Tax Compliance Theory. In the 1970s, American scholars began to study the field of tax compliance, and the theory had two representative definitions [18, 19].

(1) In 1972, Allingham and Sandham used a model to demonstrate the pursuit of self-interest by rational taxpayers under the assumption of rational taxpayers. This showed that taxpayers' compliance with tax regulations depends on whether their interests are met.

(2) In 1973, Srinivasan explored how taxpayers report and evade taxes and what factors affect tax compliance and its costs by establishing a model that optimizes taxpayers' expected income. This constituted the basic theoretical model for studying tax evasion.

Tax compliance refers to whether taxpayers have fulfilled their tax obligations. It covers whether to pay the tax on time according to the tax amount determined by laws and regulations and whether there is an overpayment or underpayment. It also includes whether the formal requirements for tax payment are complete. That is, whether the declaration procedures are complete, and whether the accounting is sound, and so on. It even includes that if taxpayers do not comply with tax laws and regulations, the tax authorities have the right to conduct tax inspections and tax enforcement measures.

In the early 2000s, the United States began to conceive of the "Tax Compliance Assurance Program." After continuous improvement, it began to be used in daily tax risk management. Gradually, a management process treats taxpayers with different tax compliance degrees, and the tax authorities adopt different management methods. There are three main foundations for this management process: formulating an overall implementation strategy for tax compliance risk management, formulating an implementation plan for tax compliance risk management, and forming a good co-governance tax compliance system.

(1) An overall implementation strategy for tax compliance risk management is developed. Different means of risk management can be adopted for taxpayers with different levels of compliance. The main goal is to make taxpayers establish awareness of conscious tax compliance. The main idea of this strategy is shown in Figure 3.

(2) An implementation plan for tax compliance risk management is developed. The tax compliance standards at all levels are detailed and also what risk management measures should be taken and what management goals should be achieved. It enables the tax authorities to grasp the intensity of implementation management in risk management and also allows taxpayers to participate in risk management. It is necessary to understand the consequences of tax compliance and mobilize the enthusiasm of both parties.

(3) A tax compliance system with good co-governance has been formed. After realizing the consequences of

tax compliance, enterprises actively participate in risk management and form a consciousness of active tax compliance. In the daily management of the enterprise, tax compliance is implemented into the financial system. By establishing a corresponding framework for tax forecasting and risk management, unreasonable tax avoidance methods can be avoided and tax compliance can be achieved.

3. The Current Situation of China's Existing Tax Risk Management and Question

3.1. The Current Situation of China's Existing Tax Risk Management. In July 2012, the National Tax System Work Conference on Deepening Tax Collection and Management put forward the general requirements for further deepening the reform of tax collection and management [20, 21]. It has established a modern tax collection and management system based on the premise of clarifying the rights and obligations of both parties, risk management as the guide, professional management as the foundation, key tax source management as the focus, and informatization as the support. Although there is no unified tax risk management process system and tax analysis model basis in various places, all provinces and cities have made a series of active explorations and efforts according to their own actual conditions [22].

In 2010, China established 554 risk control centers at the municipal bureau level, 1452 risk control centers at the district bureau level, and 844 tax assessment offices nationwide. Risk control projects were started from city and district risk control centers, and risk identification and risk ranking are led by city or district risk control centers. Enterprises with suspected risks are screened out, and then, the districts and counties organize risk response and deal with them. By 2022, there will be 1,234 risk control centers at the city bureau level, 2,456 risk control centers at the district bureau level, and 2,112 tax assessment offices. From 2010 to 2022, the changes in the number of risk control centers at the city bureau level, risk control centers at the district bureau level, and tax assessment offices are shown in Figure 4.

3.1.1. Risk Identification and Ranking. According to the tax types, industries, and specific matters involved in the risk intelligence, commonalities are found and the reasons and circumstances of the risks are analyzed. By determining the risk monitoring ideas, we set up tax risk indicators and models. The risk control projects are divided and started according to tax types, industries, and specific matters. There is a wide variety of risk intelligence, and the taxes involved are inconsistent and overlapping. Therefore, when analyzing the basic situation of risk objects, determining risk monitoring ideas, and determining the indicator system, special attention should be paid to the attributes of the industry and taxpayer.

3.1.2. Risk Response and Experience Feedback. After model analysis and scoring, the scores are ranked from high to low, corresponding to high-, medium-, and low-risk objects,
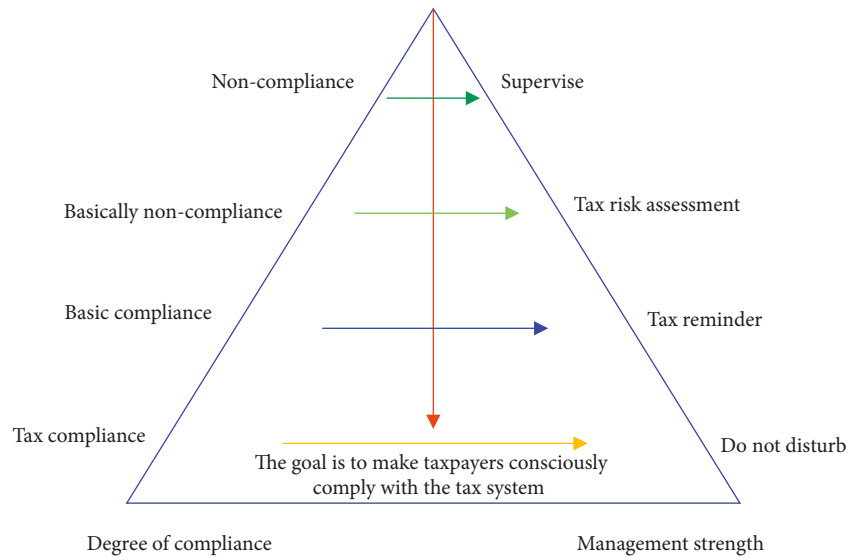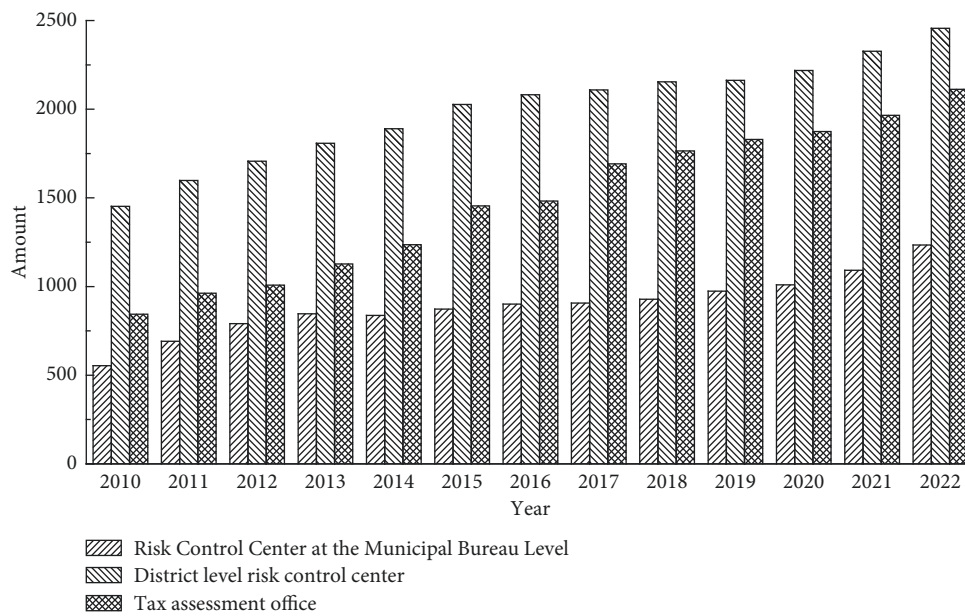
FIGURE 3: The main idea of the strategy.

FIGURE 4: The number of risk control centers at the city bureau level, risk control centers at the district bureau level, and tax assessment offices.

respectively. Tax audit posts deal with high-risk objects, assign tax assessment posts to deal with medium-risk objects, and assign daily inspections to low-risk projects. The difficulties and experiences in the process of risk response are summarized.

3.2. Problems Existing in Tax Risk Management

3.2.1. The Relevant Laws and Regulations Are Not Perfect. At present, China's tax laws and regulations system need to be improved. At present, only the Enterprise Income Tax Law, the Individual Income Tax Law, and the Tax Collection and Administration Law have been enacted by the National

People's Congress, and many other regulations exist in the form of administrative regulations and departmental rules. These regulations not only have low legal effect but also are not rigorous enough in content, poorly systematic, and have many loopholes [23]. Objectively, there are still some defects on the theoretical basis of tax risk management. One of the basic principles of the tax risk management system must be standardized, but the imperfect and unsystematic scattered laws and policies have caused ambiguity and extensive use of discretionary power to tax law enforcement itself. Whether a business behavior is illegal or not, and if it is not clearly defined by law, the tax risk management system will not be able to define the risk level of the behavior.

3.2.2. The Quality of Data Collection and Management Capabilities Need to Be Improved.

The most basic and important part of the tax risk management system is data collection. Whether the data collection is large in quantity and high in quality directly determines whether the entire tax risk management process can be carried out smoothly and whether the results are correct. Among the internal data collected by the tax system, taxpayers' daily declaration information and invoice issuance information account for the vast majority. Therefore, the information of tax authorities to taxpayers is asymmetric.

3.2.3. Information Asymmetry in the Tax System.

From the perspective of various departments within the tax authority, there is information asymmetry between the goods and labor tax and income tax departments, the collection management department and the inspection department, and the inspection department and the tax assessment department. There is overlapping information that is needed, but the level of information sharing is not high. There is a lot of repetitive work in multiple departments, which greatly reduces work efficiency [24–26]. Information asymmetry theory tells us to attach great importance to the irreplaceable role of information in economic, cultural, and political life. In such an era of risk economy, high returns, high risks, and high uncertainty coexist; if we can master and understand correct and complete information, we can gain comparative advantage earlier [27, 28].

3.2.4. The Phenomenon of Cross-Departmental Information Silos.

Information asymmetry is also prevalent across sectors. Tax authorities, other government agencies, banks, insurance, securities, and other financial institutions have their own unique information systems, databases, operating systems, and application software, which are independent of each other. If there is a need for communication between these series of information systems, there is no medium for connecting and communicating at all. Objectively, the phenomenon of information islands is formed. For example, when tax authorities deal with tax-related matters, collect taxes, and check for loopholes in collection, it is not sufficient to rely only on the information filled in by taxpayers, and data from third-party organizations is also required for comparison and analysis. When third-party agencies work, they also need the cooperation of tax authorities.

3.2.5. A Systematic, Clear, and Unified Risk Management System Has Not Been Established.

At this stage, China does not have a department specifically responsible for tax risk management in the State Administration of Taxation. Tax risk management is embodied in the separate work or division of labor of multiple business departments such as collection and management, goods and labor tax, income tax, large enterprise management, and international tax management [29]. In practical work, tax administrators undertake most of the functions of tax risk management.

Since the vast majority of provinces and cities do not have special tax risk management departments, the tax administrators of enterprises have assumed a series of responsibilities from identification to response to tax risk management. It is necessary to dig out the existing or potential risk points in the daily declarations and tax-related transactions of enterprises on weekdays. At present, the increasing tax revenue and the number of tax registration households are completely disproportionate to the increase in the number of tax administrators. There are countless companies that open, cancel, and purchase invoices and file tax returns every day. Tax administrators have a lot of work pressure and a lot of business. Just dealing with the large number of tax-related matters at hand is still too busy. There is simply no time to take into account the in-depth understanding of each business to explore its existing or potential tax risks. Tax revenue in 2022 is a 1,245% increase over 2010 tax revenue. The total number of tax-registered households in the tax system increased by 447% (as shown in Figure 5(a)). The number of households managed by a tax administrator will increase from 230 in 2010 to 312 in 2022. The tax revenue that a tax administrator is responsible for will increase from 21.04 million yuan in 2010 to 101.04 million yuan in 2022 (as shown in Figure 5(b)).

4. Enterprise Financial and Tax Risk Assessment

This paper takes enterprise A as the research object. The tax risk evaluation indices are selected and a tax risk evaluation model is established. The analytic hierarchy process (AHP)-entropy weight method [30] is used to give weights to the indicators and finally confirm the tax risk situation of enterprise A. Thus, the tax risk assessment of enterprise A is carried out.

4.1. Selection of Tax Risk Assessment Indicators.

The reasons that affect tax risk are divided into internal reasons and external reasons. However, because the external reasons are difficult to be transferred by the will of the enterprise, the tax risk evaluation system in this paper takes the internal reasons of the enterprise causing tax risk as the indices. The first criterion for selecting indicators is availability. The selected indicators must be easy to obtain and easy to calculate. It is best to reflect directly on the content of the financial statements. This will not increase the burden on the company's future work. The selected indicators must be relevant to tax risk. A possibility that an enterprise currently has tax risks can be determined directly or indirectly through the level of indicators. To sum up, this paper selects five categories of indicators for the tax risk assessment model based on the characteristics of enterprise A and the tax audit preferences of the tax authorities. These indicators are the indicators of solvency, production and sales, profitability, operating capacity, and tax burden (hereinafter referred to as debt solvency, production, profit, operation, and tax burden). Three indicators are selected from each category, and 15 indicators are used for risk assessment.
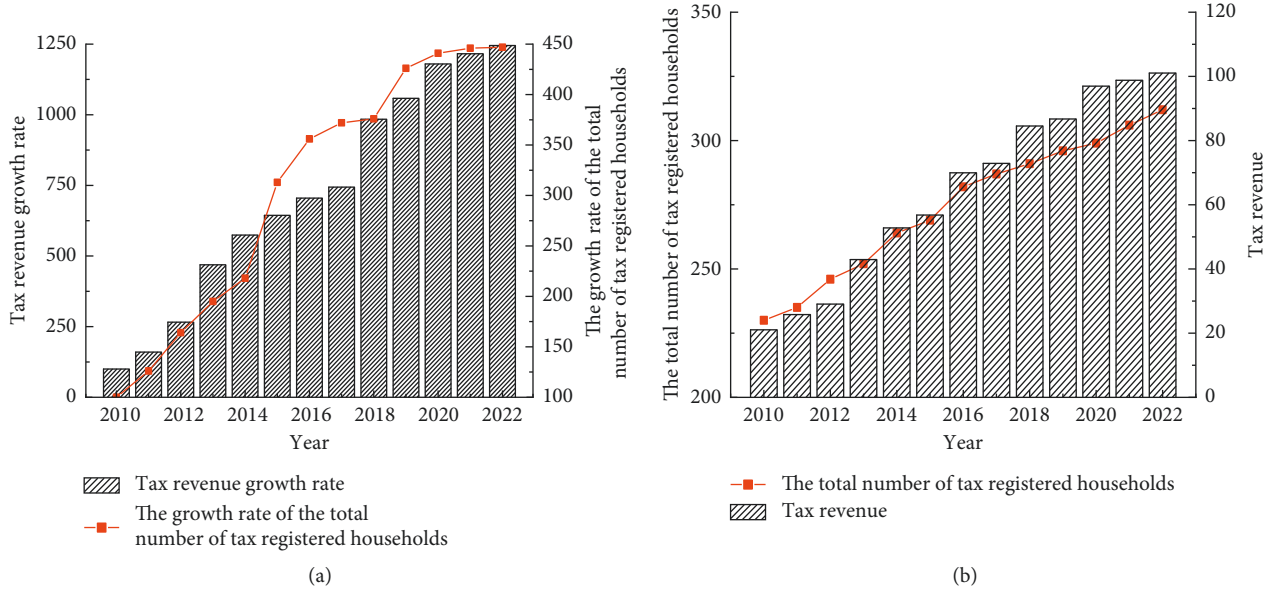
(a)

(b)

FIGURE 5: The relationship between tax revenue and the number of households and the number of tax commissioners. (a) Growth in tax revenue and total tax-registered households. (b) The rate of change in the number of tax-registered households and tax revenue.

The solvency index reflects the solvency of enterprise A. That is, whether long-term and short-term debt can be repaid on time. It includes gearing ratio (b1), current ratio (b2), and quick ratio (b3). The production and sales indicators include the cost of sales rate (b4), the sales period expense rate (b5), and the nonoperating expenditure rate (b6). The profitability indicators include operating profit margin (b7), return on equity (b8), and return on total assets (b9). The operational capability indicators include inventory turnover (b10), fixed asset turnover (b11), and total asset turnover (b12). The tax burden indicators include the value-added tax burden rate (b13), the corporate income tax rate (b14), and the tax burden rate (b15).

4.2. Weights of Tax Risk Assessment Indicators.
In order to construct the AHP-entropy weight method tax risk assessment model, it is necessary to determine the weight of each index. First, AHP is used to construct the tax risk evaluation model of enterprise A, and then, the entropy weight method is tested and corrected.

4.2.1. Analytic Hierarchy Process Index Weight.
Through the results of the questionnaire, the pairwise comparison matrix of the tax risk indicators of the enterprise is obtained as shown in Table 1.

4.2.2. Determining the Indicator Weights.
The maximum eigenvalue of the first-level classification of the index can be calculated by MATLAB software:

$$\lambda_{\max} = 5.107, \tag{1}$$

where $\lambda_{\max}$ is the maximum eigenvalue of the first-level classification of the index.

The consistency index CI is calculated based on the characteristic root:

$$CI = \frac{\lambda_{\max-n}}{n-1},$$
$$CR = \frac{CI}{RI}. \tag{2}$$

According to the average random consistency index data table, when $n = 5$, RI = 1.12. Therefore, (3) can be obtained.

$$CI = 0.027, CR = 0.024 < 0.1. \tag{3}$$

According to the CR value in formula (3), it can be seen that the result meets the requirements of consistency test. Using MATLAB, the weight vector is obtained as

$$W = (0.1107, 0.2934, 0.0726, 0.0382, 0.4851). \tag{4}$$

where W is the weight vector.

According to this method, the weights of classification indicators and detailed indicators can be calculated (as shown in Figure 6).

The weight of the tax burden under the AHP method is the largest at 45.5%. From this, it can be seen that the overall level of tax risk of enterprise A has a greater impact, and the second place is the production and sales indicators, with a weight of 28.3%. Among the specific indicators, the one that has the greatest impact on the tax risk of enterprise A is the tax burden rate. The lowest impact on the enterprise's tax risk is the total asset turnover ratio.

4.2.3. Indicator Weight Correction.
The weight of each index under the entropy weight method is calculated. The weight under the AHP method is modified by the weight under the entropy weight method. According to the above analysis of

TABLE 1: Pairwise comparison matrix of tax risk indicators of enterprise A.

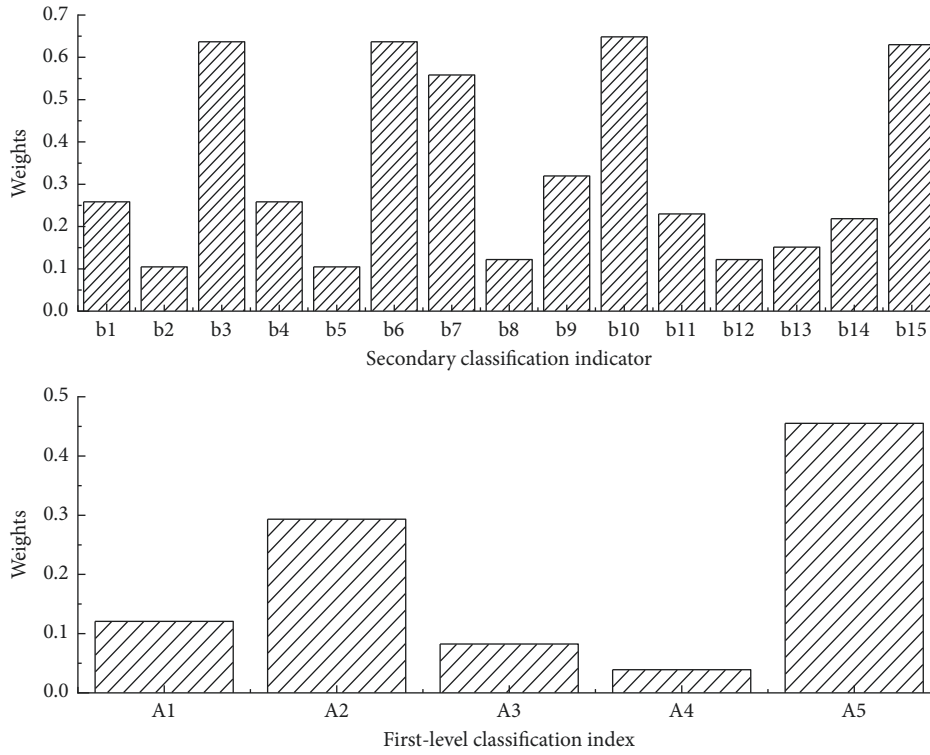|	Pay off debt	Production	Profit	Operation	Tax burden
Pay off debt (A1)	1	1/3	2	3	1/5
Production (A2)	3	1	5	7	1/2
Profit (A3)	1/2	1/5	1	3	1/7
Operation (A4)	1/3	1/7	1/3	1	1/9
Tax burden (A5)	5	2	7	9	1

FIGURE 6: Weight distribution of tax risk assessment indicators under the AHP method.

the selected indicators, it can be found that although the selected indicators are related to tax risks, the correlations are not uniform. Negatively correlated indicators need to be positively processed.

4.2.4. Indicator Forwarding and Normalization. After the forward processing, the indicators need to be standardized.

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} \sqrt{x_{ij}^2}}, \tag{5}$$

where p_{ij} is the element of the normalized matrix and x_{ij} is the element of the forwardization matrix.

4.2.5. Calculate Indicator Weights. After the standardization of the indicators is obtained, the entropy weight of each tax risk index can be obtained according to the entropy weight method.

$$e_j = -\frac{1}{\ln(m) \sum_{i=1}^{m} x_{ij} \ln\left(p_{ij}\right)}, \quad (j = 1, 2 \ldots, n),$$

$$\theta_j = -\frac{d_j}{\sum_{j=1}^{n} d_j}, \quad (j = 1, 2 \ldots, n), \tag{6}$$

$$d_j = 1 - e_j,$$

where e_j is the information entropy, d_j is the information utility value, θ_j is the entropy weight, n is the number of indicators, and m is the number of samples.

4.2.6. Indicator Weight Confirmation. Through the correction of the weight of the tax risk index by the entropy weight method, the weight of the tax risk index of small and medium-sized manufacturing enterprises under the AHP-entropy weight method is finally confirmed.
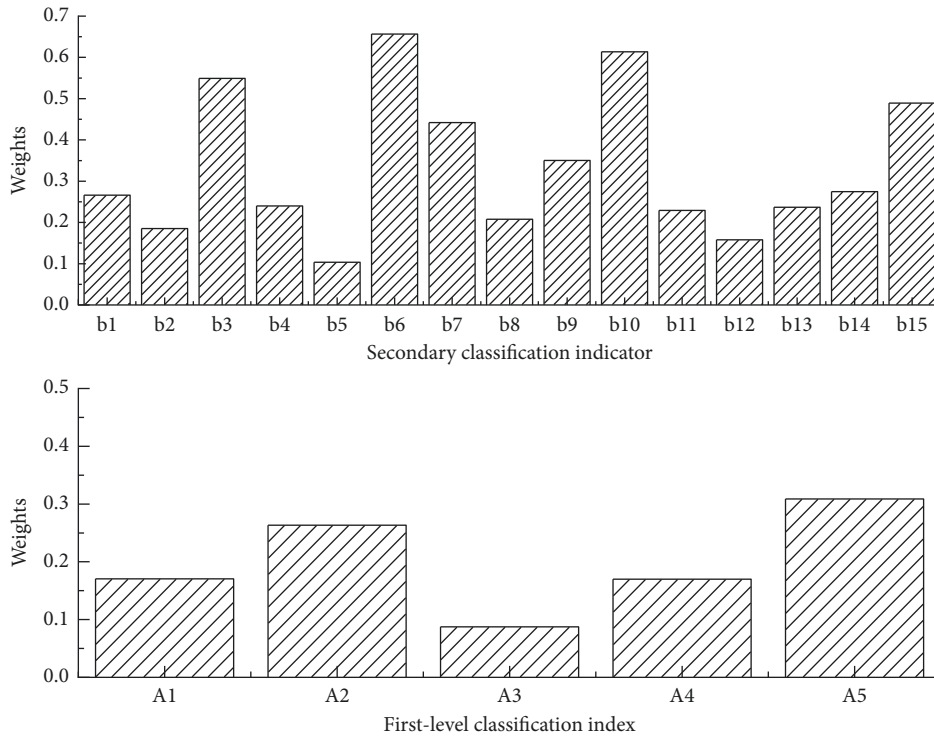
FIGURE 7: The weights of the revised classification indicators and detailed indicators.

$$w_j = \alpha \cdot z_j + (1 - \alpha)\theta_j, \qquad (7)$$

where z_j is the weight under the analytic hierarchy process and α is the coefficient.

According to this method, the weights of the revised classification indicators and detailed indicators can be calculated (as shown in Figure 7).

4.3. Tax Risk Assessment Results under AHP-Entropy Weight Method.
After normalizing the data, the following formula is used to calculate the risk value of each indicator.

$$R_i = p_{ij} \cdot w_j,$$
$$R = \sum \frac{R_i}{m}, \qquad (8)$$

where R_i is the risk value of the ith sample.

After calculation, the tax risk probability of enterprise A is obtained as shown in Figure 8.

It can be seen from Figure 8 that the enterprise has been exposed to relatively large tax risks in recent years. Since 2019, tax risk has been higher than the industry level, which is closely related to enterprise A's neglect of tax risk. The tax risk of enterprise A in 2022 will be greatly alleviated, and the tax risk will be 0.63% higher than the industry level. This is roughly in line with industry risk. This is inseparable from the fact that with the gradual deepening of society's understanding of tax risks, the enterprise is also inclined to control tax risks in daily operations and corporate decision-making.

4.4. Analysis of Tax Risk Assessment Results.
Through the above calculation of the tax risks of enterprise A and the industry, the comparison of the tax risks of enterprise A and the industry is obtained. First, the overall risk evaluation of enterprise A is carried out, and then, the tax risk evaluation of the classification indicators is carried out. Based on the calculation results of the risk evaluation index, the analysis conclusion is drawn.

4.4.1. Overall Risk Assessment.
In terms of overall risk, the tax risk of enterprise A has always been higher than the industry level. This shows that in the past four years, especially from 2019 to 2020, although enterprise A has continued to operate, the tax risk has remained high. On a year-on-year basis, the tax risk volatility of enterprise A has been relatively small. It means that enterprise A has basically no control over tax risks in the past three years. Basically, it fluctuates slightly according to the management strength of the tax department and the level of the general environment. Through the data from 2019 to 2020, it can be considered that enterprise A has not been active enough in responding to tax risks.

4.4.2. Classification Index Risk Assessment.
Further tax risk assessment and analysis are carried out for the specific indicators of the second level. The analysis and comparison of enterprise A and industry secondary indicators from 2019 to 2022 are shown in Table 2.

It can be seen from Table 2 that the operating capacity and profitability have the greatest tax risks. Enterprise A has
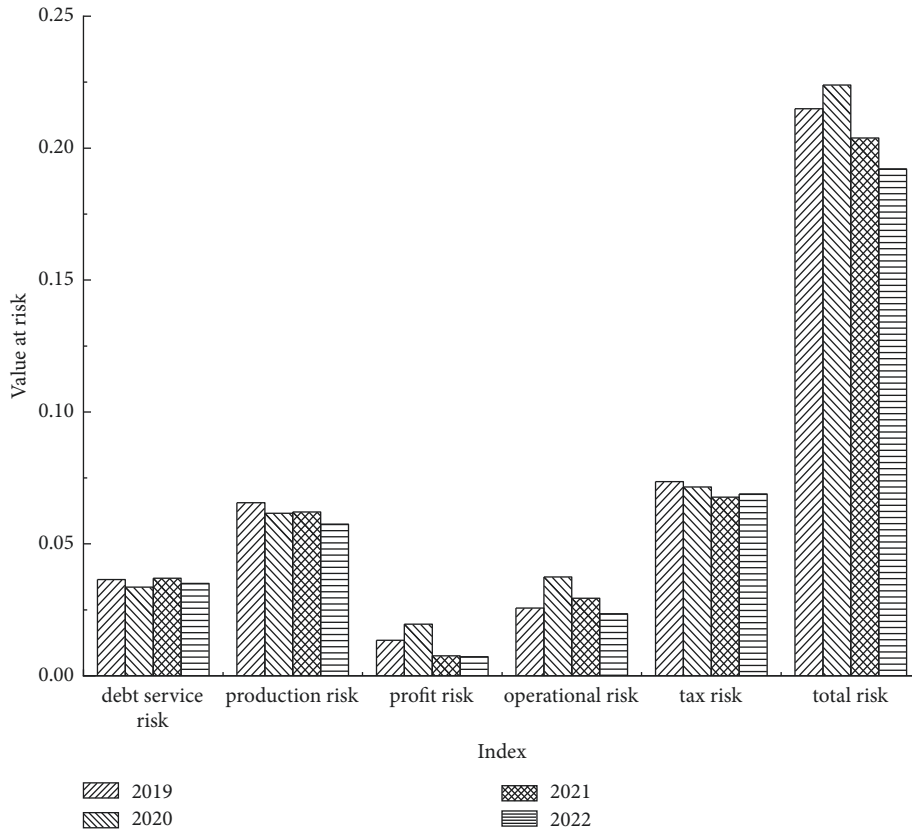
(a)
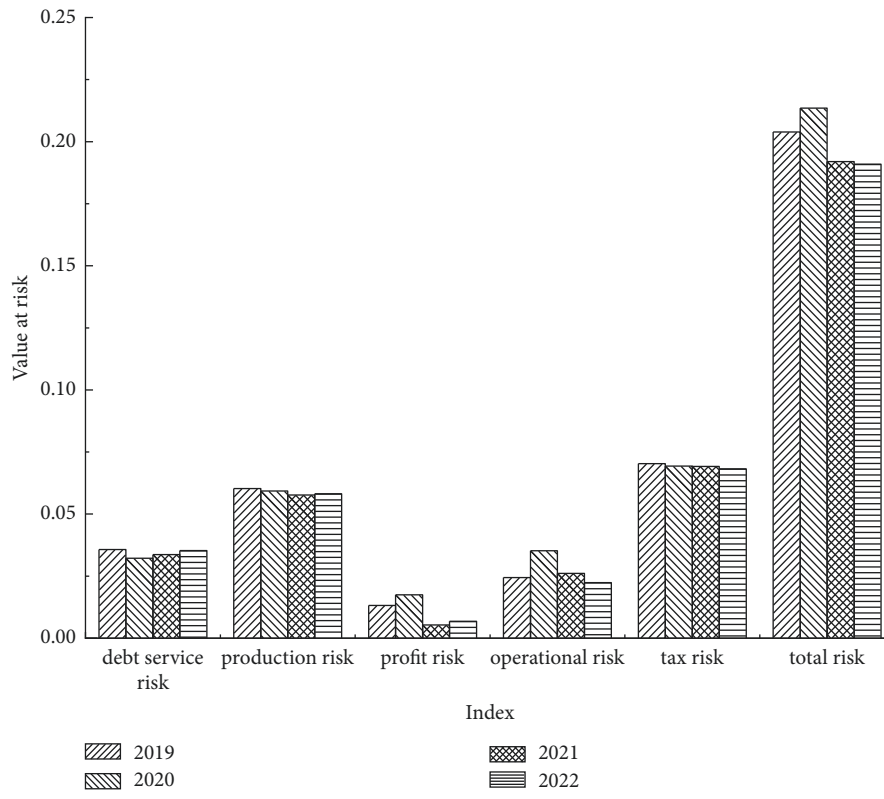
(b)

FIGURE 8: The tax risk probability of enterprise A. (a) Enterprise A's value at risk; (b) industry average value at risk.

Table 2: The analysis and comparison of enterprise A and industry secondary indicators from 2019 to 2022.

Secondary indicators		2019	2020	2021	2022
Pay off debt	Enterprise A	0.0365	0.0336	0.037	0.035
	Industry	0.0357	0.0322	0.0337	0.0353
Production	Enterprise A	0.0656	0.0616	0.0621	0.0575
	Industry	0.0603	0.0593	0.0577	0.0582
Profit	Enterprise A	0.0135	0.0196	0.0076	0.0072
	Industry	0.0132	0.0175	0.0053	0.0068
Operation	Enterprise A	0.0257	0.0375	0.0294	0.0235
	Industry	0.0244	0.0352	0.0261	0.0224
Tax burden	Enterprise A	0.0736	0.0716	0.0677	0.0689
	Industry	0.0703	0.0693	0.0692	0.0682

the problems of chaotic inventory management and inconsistent cost accounting methods. This is also coinciding with poor operating capacity and profitability. This in turn increases the tax risk of operating capacity and profitability.

Among the five classification indicators, the tax burden is different from other indicators. Compared with the industry, if the tax burden indicator is too high or too low, tax risks will arise. If it is too high, it means that the enterprise has paid too much tax compared with the industry level, resulting in the tax risk of overpaying tax. If it is too low, it means that the company may under-report or under-report income, under-report profits, etc., resulting in the tax risk of being audited by the tax department. In terms of the tax risk of the tax burden in the past four years, the tax risk value of enterprise A is slightly higher than the industry average. However, the degree of deviation is not high, and the tax risk is not high.

The tax risk weights determined according to the AHP-entropy weight method are ranked from high to low as tax burden, production and sales, solvency, operating ability, and profitability. For enterprise A, the indicators with the greatest tax risk are the two indicators with the lowest weights. This shows that although some factors have less impact on tax risk, if they are neglected for a long time, they may also become the biggest factor affecting tax risk.

5. Effective Strategies for Enterprise Tax Risk Management in the Era of Big Data

5.1. Require Enterprise Managers and Related Personnel to Have a Tax Management Concept that Keeps Pace with the Times. Tax risk management runs through the entire enterprise operation and management process, such as enterprise strategic decision-making, internal management control, production operation, and financial processing [31]. Enterprises can establish a departmental tax integration mechanism based on the premise of controlling tax risks and elevate it to the decision-making and management level. Fiscal and tax risks must be fully taken into account when formulating and proving the feasibility of the project and making decisions about the project. Enterprises should regularly conduct tax risk knowledge training for relevant senior management personnel so that senior management

personnel realize the necessity of tax management risk. The potential tax risks should be considered when formulating development strategies and decisions. At the same time, enterprises should also strengthen the training of the tax professional competence and knowledge of the company's financial personnel. By raising the awareness of tax risk management and improving the professional ability and level of financial personnel, financial personnel can better identify risks. Furthermore, by strengthening the prevention of tax risks, the level of enterprise tax risk management will be improved [32].

5.2. Strengthen Tax Planning Ability. While using big data resources, companies need to face the strict information monitoring requirements of tax collection and management agencies, especially after taxation uses the golden tax three-phase system. Whether it is system logic monitoring, data auditing, or monitoring technology, it is more advanced and scientific than before. Enterprises are also faced with an unprecedented severe regulatory situation. In order to adapt to the new situation, companies should have an in-depth understanding of the latest and most cutting-edge fiscal and tax policies according to their own development and needs. By formulating tax planning and regulatory benchmarks suitable for company development, policy-based tax evasion, underpayment of tax, and improper use of tax incentives are avoided. On this basis, by combining the situation of our own enterprise and using tax policies to make reasonable tax planning, we can effectively and legally save tax costs for the company.

5.3. Strengthen the Quality of Accounting Work. The financial and taxation department is the final link of tax accounting, and the quality of accounting directly affects taxation and financial risks. Therefore, financial personnel must continuously improve the accounting quality and avoid financial and tax risks. First of all, it is necessary to improve the quality of accountants and build a modern accounting team of professional elites to improve the efficiency and quality of accounting work. Secondly, the use of information technology in accounting work not only improves the accuracy of accounting but also improves the efficiency of information processing, especially in some large companies, through the rational use of computer technology and integration of data resources in each branch to simplify the workflow.

By shifting the focus of financial work from accounting to accounting and financial management, financial data are more instructive for management decision-making. Finally, for some small and microenterprises with insufficient accounting personnel, or small and microenterprises without specialized accounting personnel, they can be handled by hiring a third-party company specializing in corporate accounting to minimize tax risks.

5.4. Establish and Formulate a Sound Tax Data Standardization System. The biggest problems faced by enterprises at present are mainly to improve the profit rate of the

enterprise, the decision-making ability of executives, and the management ability of tax risks. However, the current work on tax data construction has not yet formed a standardized trend. The correlation between data is poor, and the usable reference value of the data is low. Therefore, it is necessary to formulate corresponding countermeasures on this basis to improve the usable value of data. For example, the construction of data planning and construction system, enterprise standardization management system, and tax risk management system are three major systems. At the same time, various process designs are carried out for the three systems. Through the delicate design of the data analysis plan and the logical relationship between the data, the integrity, accuracy, standardization, professionalism, and logic of the data are more in line with the needs of users, and data-to-data connectivity becomes stronger. Through the value system and data analysis, more risk doubts were reported, and a data management atmosphere of using data to manage, make decisions, guide, and innovate was actively created in tax management and control. Finally, it will escort the healthy development of enterprises in the era of big data information.

5.5. Establish a Management and Supervision Mechanism. Management authorities and tax risk control departments must play a full role in effectively supervising tax-related activities. By establishing a scientific evaluation system and standard evaluation indicators, the quality and effectiveness of risk response have been improved. At the same time, through the establishment of a performance appraisal system for information management, analysis, identification, and response processing positions, responsibilities and reward and punishment systems are clarified. By strengthening risk integration monitoring and control, and risk integration measures, methods and steps need to be further clarified. It also needs to focus on monitoring and ex-post evaluation. By strengthening internal and external related functional supervision, we will establish a sound supervision mechanism and performance management mechanism, and clarify the responsibilities of all parties.

5.6. Design a Scientific and Reasonable Tax Risk Management Process. In the process of constructing a tax risk management system, it is first necessary to define the key control points of tax risk. At the same time, it should be recognized that a clear tax risk management process is at the core. Enterprises should take control of management risks as the starting point and comprehensively sort out the management system. From the perspective of modern internal control concept, the management and control focus of each department is re-examined and studied through big data information. It is necessary to focus on the analysis of different tax types as well as the analysis of tax-related matters. Based on the cost-benefit principle, it can improve the daily tax control management process and strengthen major economic activities such as restructuring and investment. It mainly strengthens its approval and planning procedures and builds a process-based and systematic risk

management system that conforms to the company's own conditions.

6. Conclusion

The enterprise has been exposed to relatively large tax risks in recent years. Since 2019, tax risk has been higher than the industry level, which is closely related to enterprise A's neglect of tax risk. The tax risk of enterprise A in 2022 will be greatly alleviated, and the tax risk will be 0.63% higher than the industry level. This is roughly in line with industry risk. This is inseparable from the fact that with the gradual deepening of society's understanding of tax risks, the enterprise is also inclined to control tax risks in daily operations and corporate decision-making.

By establishing the AHP-entropy weight method tax risk evaluation model, the tax risk of enterprise A in the past four years is evaluated. By comparing with the risks of enterprises in the industry, three levels of risk analysis are established. The results show that the overall tax risk situation of enterprise A in 2019–2020 is not very good, but the tax risk of enterprise A in 2022 has been greatly improved compared with the previous two years. It shows that the tax risk of enterprise A is gradually improving.

The weight of the tax burden under the AHP method is the largest at 45.5%. From this, it can be seen that the overall level of tax risk of enterprise A has a greater impact, and the second place is the production and sales indicators, with a weight of 28.3%. Among the specific indicators, the one that has the greatest impact on the tax risk of enterprise A is the tax burden rate. The lowest impact on the enterprise's tax risk is the total asset turnover ratio.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] G. Yumin, "Analysis of financial risk management of E-commerce enterprises based on big data," in *Proceedings of the 2020 The 4th International Conference on E-Business and Internet*, pp. 37–41, New York, NY, U.S.A, October 2020.

[2] A. Urbinati, M. Bogers, V. Chiesa, and F. Frattini, "Creating and capturing value from Big Data: a multiple-case study analysis of provider companies," *Technovation*, vol. 84-85, pp. 21–36, 2019.

[3] Y. Zhang and Y. Yan, "Path analysis about the integration of enterprise business and finance under the background of big data and artificial intelligence," in *Proceedings of the 2018 2nd International Conference on Advances in Management Science and Engineering(AMSE 2018)*, pp. 203–207, Xi'an, China, January 2018.

[4] X. Cong, "Research on financial risk management of E-commerce enterprises in the era of big data," in *Proceedings of the 2021 The 7th International Conference on Frontiers of Educational Technologies*, pp. 195–199, Bangkok, Thailand, June 2021.

[5] R. Wei and S. Yao, "Enterprise financial risk identification and information security management and control in big data environment," *Mobile Information Systems*, vol. 2021, pp. 1–6, Article ID 7188327, 2021.

[6] G. Žigienė, E. Rybakovas, and R. Alzbutas, "Artificial intelligence based commercial risk management framework for SMEs," *Sustainability*, vol. 11, no. 16, p. 4501, 2019.

[7] L. Chen, "Analysis on financial management of small and micro enterprises based on cloud accounting in big data age," in *Proceedings of the 2020 Management Science Informatization and Economic Innovation Development Conference (MSIEID)*, pp. 351–354, IEEE, Guangzhou, China, December 2020.

[8] L. Yujie and C. Xiaofang, "The influence of" golden tax third period" on enterprise tax-related services," in *Proceedings of the 2020 international conference on big data economy and information management (BDEIM)*, pp. 74–78, IEEE, Zhengzhou, China, December 2020.

[9] L. Liu, "Application strategy of big data in enterprise financial management from the perspective of risk society coupling," in *Proceedings of the International Conference on Frontier Computing*, pp. 1661–1668, Springer, Singapore, January 2020.

[10] D. F. Cai, N. N. Ni, and J. Cai, "Big enterprise tax risk management: warning, simulation and application," *International Journal of u- and e-Service, Science and Technology*, vol. 8, no. 4, pp. 135–146, 2015.

[11] M. S. Beasley, R. Clune, and D. R. Hermanson, "Enterprise risk management: an empirical analysis of factors associated with the extent of implementation," *Journal of Accounting and Public Policy*, vol. 24, no. 6, pp. 521–531, 2005.

[12] J. Dvorsky, J. Belas, B. Gavurova, and T. Brabenec, "Business risk management in the context of small and medium-sized enterprises," *Economic Research-Ekonomska Istraživanja*, vol. 34, no. 1, pp. 1690–1708, 2021.

[13] K. M. Brojo, K. Vivek, K. P. Sanjaya, and T. Prayag, *Handbook of Research for Big Data:Concepts and Techniques*, Apple Academic Press, New Jersey, NJ, U.S.A, 2021.

[14] F. Almeida, "Big data: concept, potentialities and vulnerabilities," *Emerging Science Journal*, vol. 2, no. 1, pp. 1–10, 2018.

[15] X. Cheng, L. Fang, X. Hong, and L. Yang, "Exploiting mobile big data: sources, features, and applications," *IEEE Network*, vol. 31, no. 1, pp. 72–79, 2017.

[16] A. Firmansyah and R. Muliana, "The effect of tax avoidance and tax risk on corporate risk," *Jurnal Keuangan dan Perbankan*, vol. 22, no. 4, pp. 643–656, 2018.

[17] I. Masri, A. Syakhroza, R. Wardhani, and N. Samingun, "The role of tax risk management in international tax avoidance practices: evidence from Indonesia and Malaysia," *International Journal of Trade and Global Markets*, vol. 12, no. 3/4, p. 311, 2019.

[18] A. Nurwanah, T. Sutrisno, R. Rosidi, and R. Roekhudin, "Determinants of tax compliance: theory of planned behavior and stakeholder theory perspective," *Problems and Perspectives in Management*, vol. 16, no. 4, pp. 395–407, 2018.

[19] K. Devos, "Tax Compliance Theory and the Literature," *Factors Influencing Individual Taxpayer Compliance Behaviour*, pp. 13–65, Springer, Dordrecht, 2014.

[20] X. L. Xu and L. J. Huang, "Research on tax risk management and control strategy of small and medium enterprise," *DEStech transactions on social science, education and human science,(aetms)*, pp. 167–170, 2017.

[21] Z. An and L. Song, "Research on the role of AHP- entropy method in the identification and evaluation of China tariff source risk," *Journal of Intelligent and Fuzzy Systems*, vol. 34, no. 2, pp. 1053–1060, 2018.

[22] M. Zhang, "Research on the application of financial and taxation big data in enterprise taxation risk management," *E3S Web of Conferences*, vol. 218, 2020.

[23] R. Lipniewicz, "Tax administration and risk management in the digital age," *Information Systems Management*, vol. 6, 2017.

[24] A. Brühne and D. Schanz, *Building up a protective shield: the role of communication for corporate tax risk management*, SSRN, Rochester, NY, U.S.A, 2018.

[25] C. M. Muchiri, *Information Technology Risk Management as a Strategic Enabler in Tax Revenue Administration: The Kenyan Context*, United States International University-Africa, Nairobi, Kenya, 2015.

[26] M. V. Afonin, "Tax risk peculiarities in project execution," *International Journal of Engineering and Advanced Technology*, vol. 8, no. 5, pp. 2226–2230, 2019.

[27] E. V. D. H. V. Dijk and M. Siglé, "Cooperative compliance: tax risk management and monitoring," *Intertax*, vol. 44, no. 8/9, 2016.

[28] M. V. Shtiller, V. L. Nazarova, I. V. Selezneva et al., "Tax risks in the company's accounting system: essence, identification and control," *International Journal of Economics and Financial Issues*, vol. 6, no. 4, pp. 1791–1797, 2016.

[29] W. Didimo, L. Grilli, G. Liotta, L. Menconi, F. Montecchiani, and D. Pagliuca, "Combining network visualization and data mining for tax risk assessment," *IEEE Access*, vol. 8, pp. 16073–16086, 2020.

[30] G. Wu, K. Duan, J. Zuo, Z. Xianbo, and T. Daizhong, "Integrated sustainability assessment of public rental housing community based on a hybrid method of AHP-entropy weight and cloud model [J]," *Sustainability*, vol. 9, no. 4, p. 603, 2017.

[31] J. J. Shan, "Optimization strategy of tax planning system in the context of artificial intelligence and big data," *Journal of Physics: Conference Series*, vol. 1345, no. 5, Article ID 052006, 2019.

[32] U. G. D. Frutos, *Tax Assurance, a Risk Management Handbook for Large Business*, Francis Lefebvre, France, 2018.